UNITED STATES PATENT AND TRADEMARK OFFICE

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EXAMINER
PHAN, TRI H

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 February 2007*.

2a)☒ This action is **FINAL.**   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24 and 26-27* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,5,7-10,12,13,15-17 and 19-22* is/are rejected.

7)☒ Claim(s) *2,3,6,11,14,18,23,24,26 and 27* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____ .

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____ .

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____ .

DETAILED ACTION

Response to Amendment/Arguments

1.   This Office Action is in response to the Response/Amendment filed on February 7th,

2007. Claim 25 is canceled. Claims 1-24 and 26-27 are now pending in the application.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the
> subject matter which the applicant regards as his invention.

3.   Claims 5-6 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

- Claim 5 recites the limitation *"said physical connection"* (line 2). There is insufficient

antecedent basis for this limitation in neither claim 5 nor its parent claims.

- Claim 6 recites the limitation *"the physical connection"* (line 4). There is insufficient

antecedent basis for this limitation in neither claim 6 nor its parent claims.

- Recitation (claim 11, line 4) is vague and indefinite because the end period is missing.

Therefore, the sentence is unclear completed or not.

Claim Rejections - 35 USC § 102

4.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5.   Claims 7-10 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by **Dally et**

al. (U.S.6,563,831; hereinafter refer as '**xxx**').

- In regard to claim 7, **Dally** discloses, *a method comprises*

determining availability of valid data in each of at least two channels (for example see

col. 9, lines 34-44; wherein selected enabled flits at input buffers are *"availability of valid data"*),

wherein said at least two channels share a physical connection to transfer data between a first

node and a second node (for example see fig. 9; wherein input/output buffers, e.g. *"first/second*

nodes", are connecting for different channels through crossbar switch , e.g. *"physical*

connection");

determining backpressure from a receiver of each channel (for example see col. 9, lines

13-46); *and*

transferring flits from one of said at least two channels along the physical connection in

response to determining that valid data is unavailable in the other channel of said at least two

channels based on said backpressure (for example see col. 10, lines 6-51; col. 21, lines 17-38).

- Regarding claims 8-10 and 12, **Dally** further discloses, *reforming said flits into packets at the other end of said channels* (for example see col. 7, lines 26-34); *and storing said reformed packets in queues for transfer to a processor bus* (for example see fig. 9; where common bus or crossbar switch disclosed in figs. 2-3 is *"processor bus"* for transferring packets to network; and wherein packets/flits are converted and transmitted through router, e.g. *"in different type of resource sharing paradigm"*).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 4, 17 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Kim, Deog-Nyoun** (U.S.5,999,534; hereinafter refer as '**Kim**').

- In regard to claims 1 and 17, **Kim** discloses *an apparatus for transferring data packets* (for example see fig. 5)*, which comprises*

a first node including a first end of a first channel and a first end of a second channel (for example see fig. 5; col. 6, lines 14-18; wherein *"first node"* includes switch 215 and FIFO queues 211 and 212, and wherein each queue connects to a virtual channel VCj of the jth

prioritized connection, e.g. *"first end of the first channel"* and *"first end of the second channel"*

such as VC1 and VC2 disclosed in fig. 2);

　　a second node including a second end of a first channel and a second end of a second

channel (for example see fig. 5; col. 6, lines 18-31; wherein *"second node"*, which includes

switches 216 and 250, connects to the other ends of VCj, e.g. *"second end of the first channel"*

and *"second end of the second channel"*,);

　　a physical connection joining said first node and said second node through

which signals of both said first channel and said second channel are carried (for example see

fig. 5; wherein *"physical connection"* is the connection line between two switches, e.g. *"first and*

second nodes"); and

　　a first controller ('first empty detector' in fig. 5) *connected to said first end of said first*

channel and a second controller ('second empty detector' in fig. 5) *connected to said first end of*

said second channel, said first controller and said second controller being in communication and

controlling transferring data from one of said two channels through said physical connection

(for example see fig. 5; col. 6, lines 18-31) *in response to determining that valid data is*

unavailable in the other channel to be transferred (for example see figs. 3A-B and 4A-B; col. 6,

lines 31-59; wherein the empty flag EFj of the empty detector, as specified in col. 4, line 65

through col. 5, line 3, determines whether or not there exists eligible cells, e.g. *"valid data is*

unavailable", for transmission as disclosed in figs. 3A-B and 4A-B. Even though, **Kim** does not

disclose about *"controller"*; however, it is obvious that in fig. 5, the first and second empty

detectors function as controlling the output switches 250-j to switch between prioritized switches

for transmitting eligible cells, e.g. *"first and second controllers"*, based on the values of empty

flag EFj).

Thus it would have been obvious to the person of ordinary skill in the art at the time of

the invention was made to implement the empty detector and the empty flag taught by **Kim**'s

system as *"controllers"*, to control the switching between switches in regulating the cells

transmission as disclosed in col. 4, lines 20-22.

- Regarding claim 4, **Kim** further discloses, *a queue for receiving data packets from said*

second end of said first channel and said second end of said second channel and for delivering

said packets to a processor bus ('prioritized queues' in fig. 2; 'FIFO queues' in fig. 5; where the

connection lines between switches 250-j and to transmitter are *"processor bus"* for transmitting

cells, e.g. "packets").

- In regard to claim 21, **Kim** discloses, *a method comprises*

determining whether a first controller ('first empty detector' in fig. 5) *and a second*

controller ('second empty detector' in fig. 5) *have data to send, wherein the first and second*

controllers are connected to a channel (for example see fig. 5; col. 6, lines 18-31); *and*

in response to determining that the second controller does not have data to send, sending

data via the first controller (for example see figs. 3A-B and 4A-B; col. 6, lines 31-59; wherein

the empty flag EFj of the empty detector, as specified in col. 4, line 65 through col. 5, line 3,

determines whether or not there exists eligible cells, e.g. *"valid data is unavailable"*, for

transmission as disclosed in figs. 3A-B and 4A-B. Even though, **Kim** does not disclose about

"*controller*"; however, it is obvious that in fig. 5, the first and second empty detectors function as controlling the output switches 250-j to switch between prioritized switches for transmitting eligible cells, e.g. "*first and second controllers*", based on the values of empty flag EFj).

Thus it would have been obvious to the person of ordinary skill in the art at the time of the invention was made to implement the empty detector and the empty flag taught by **Kim**'s system as "controllers", to control the switching between switches in regulating the cells transmission as disclosed in col. 4, lines 20-22.

- Regarding claim 22, **Kim** further fails to explicitly disclose about *determining which controller was the last one to send data*. However, it is obvious that, the last empty detector send the empty flag Efj for controlling the output switch is the "*last one to send data*".

Thus it would have been obvious to the person of ordinary skill in the art at the time of the invention was made to implement the last sending empty flag's empty detector as taught by **Kim**'s system as "*last one to send data*", to control the switching between switches in regulating the cells transmission as disclosed in col. 4, lines 20-22.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Kim, Deog-Nyoun** (U.S.5,999,534) in view of **Joseph et al.** (U.S.6,628,615; hereinafter refer as '**Joseph**').

- In regard to claim 5, **Kim** discloses all the subject matter of the claimed invention including apparatus and method for regulating and scheduling cells in transmission, as discussed in part 7 above of this office action. **Kim** does disclose where the connection lines between

switches 250-j and to transmitter are *"processor bus"* for transmitting cells, e.g. *"packets"*; but

fails to explicitly disclose about *"flits"* . However, such implementation is known in the art.

For example, **Joseph** discloses the two level virtual channel network interface, wherein

packets are divided into flits by the flit handler for transmitting over network (*"physical*

connection carries flits"; for example see figs. 2, 4 and 5; col. 1, lines 37-46; col. 7, lines 1-11).

Thus it would have been obvious to the person of ordinary skill in the art at the time of

the invention was made to implement the two level virtual channel network interface as taught

by **Joseph** in **Kim**'s system, with the motivation being to improve the performance of data

transmission through the network as disclosed in col. 1, lines 7-10.

9.   Claims 13, 15-16 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable

over **Kim, Deog-Nyoun** (U.S.5,999,534) in view of **Dally et al.** (U.S.6,563,831; hereinafter refer

as '**Dally**').

- In regard to claim 13, **Kim** discloses, *a system for transferring data packets* (for

example see figs. 8-9; Abstract) *comprises*

a first node (for example see fig. 5; wherein *"first node"* includes switch 215 and FIFO

queues 211 and 212);

a second node (for example see fig. 5; wherein *"second node"*; which includes switches

216 and 250);

at least one physical connection connecting said first node to said second node (for

example see fig. 5; wherein "physical connection" is the connection line between two switches,

e.g. "first and second nodes");

a processor bus connected to said second node (for example see figs. 4A-B and 5; where

the connection lines between switches 250-j and to transmitter are "processor bus" for

transmitting cells);

a first data channel and a second data channel each having a first end in said first node

and a second end in said second node, and both channels being carried by said physical

connection (for example see fig. 5; col. 6, lines 14-18; col. 6, lines 18-31; wherein each queue

connects to a virtual channel VCj of the jth prioritized connection, e.g. "first/second ends of the

first channel" and "first/second ends of the second channel" such as VC1 and VC2 disclosed in

fig. 2). **Kim** fails to disclose wherein "channels carrying data packets divided into flits, with flits

from one of the two data channels being transferred in said physical connection where there is

no flit available in the other data channel for a transfer". However, such implementation is

known in the art.

For example, **Dally** discloses wherein channels carrying data packets divided into flits,

with flits from one of the two data channels being transferred in said physical connection where

there is no flit available in the other data channel for a transfer (for example see col. 9, lines 34-

44; wherein selected enabled flits are "available flits" for transferring through different channels

connections between input/output buffers as disclosed in fig. 9).

Thus it would have been obvious to the person of ordinary skill in the art at the time of

the invention was made to implement the invention such as divided packets into flits for

transferring when there is no flit available in the other data channel for a transfer as taught by **Dally** into **Kim**'s system, for regulating the cells or packets' transmission between routers as disclosed in col. 2, lines 50-65.

- Regarding claims 15-16, **Kim** further fails to disclose *wherein first and second channels utilizes the physical connection to transfer flits based on whether an receiving end of each channel is able to receive more flits*. However, such implementation is known in the art.

For example, **Dally** discloses *wherein flits are interleaved further based on whether an receiving end of each channel is able to receive more flits* (for example see col. 10, lines 37-51).

Thus it would have been obvious to the person of ordinary skill in the art at the time of the invention was made to implement the invention as *interleave flits based on whether an receiving end of each channel is able to receive more flits* as taught by **Dally** into **Kim**'s system, for regulating the cells or packets' transmission between routers as disclosed in col. 2, lines 50-65.

- In regard to claims 19-20, **Kim** further fails to disclose about *backpressure* in response to transferring data. However, such implementation is known in the art.

For example, **Dally** discloses, *determining that the channel connecting to the other controller receives back pressure* (for example see col. 9, lines 13-45; col. 10, lines 6-15).

Thus it would have been obvious to the person of ordinary skill in the art at the time of the invention was made to implement the *back pressure* as taught by **Dally** into **Kim**'s system, for regulating the cells or packets' transmission as disclosed in col. 2, lines 50-65.

Response to Arguments

10.   Applicant's arguments filed on February 7th, 2007 with respect to claims 1-24 and 26-27

have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

11.   Claims 2-3, 6, 11, 14, 18, 23-24 and 26-27 are objected to as being dependent upon a

rejected base claim, but would be allowable if rewritten in independent form including all of the

limitations of the base claim and any intervening claims.

Conclusion

12.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

        Lund et al. (U.S.5,517,495) and **Seto et al.** (U.S.7,050,468) are all cited to show devices

and methods for improving the performance of data transmission in the communication

architectures, which are considered pertinent to the claimed invention.

        Applicant's amendment necessitated the new ground(s) of rejection presented in this

Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

        A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this

final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Tri H. Phan, whose telephone number is (571) 272-3074. The

examiner can normally be reached on M-F (8:00-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Chi H. Pham can be reached on (571) 272-3179.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(571) 273-8300

Hand-delivered responses should be brought to Randolph Building, 401 Dulany Street,

Alexandria, VA 22314.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the Technology Center 2600 Customer Service Office, whose telephone

number is (571) 272-2600.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tri H. Phan
April 30, 2007

CHI PHAM
SUPERVISORY PATENT EXAMINER